

CLAIMS

- 1 1. A modular direct oxidation fuel cell array, comprising:
2 a plurality of individual direct oxidation fuel cells, each fuel cell having
3 a membrane electrode assembly and an anode current collector and a cathode current
4 collector, each fuel cell having a first electrical coupling component disposed thereon
5 and a second electrical coupling component disposed in a different location on said fuel
6 cell, which second component corresponds with a first component of an adjacent cell
7 to electrically and/or mechanically couple the cells together, to form a modular fuel cell
8 array.

- 1 2. The modular direct oxidation fuel cell array as defined in claim 1 wherein said
2 first electrical coupling component is a plug member, and said second electrical
3 coupling component is a socket wherein adjacent fuel cells are connected by a plug-and-
4 socket configuration.

- 1 3. The modular direct oxidation fuel cell array as defined in claim 1 wherein said
2 first electrical coupling component is a spring tab member, and said second electrical
3 coupling component is a second spring tab member wherein adjacent fuel cells are
4 connected by compression of said first and second spring tab members between
5 adjacent cells.

- 1 4. The modular direct oxidation fuel cell array as defined in claim 1 wherein said
2 first electrical coupling component is a set of interleaved metal tabs, and said second
3 electrical coupling component is a second set of interleaving metals tabs, wherein
4 adjacent fuel cells are connected by interlocking said first and second metal tabs of
5 adjacent cells together.

1 5. The modular direct oxidation fuel cell array as defined in claim 1 wherein said
2 first and second coupling components are substantially surrounded by a protective
3 covering.

1 6. A modular direct oxidation fuel cell array, comprising:
2 a plurality of individual direct oxidation fuel cells, each fuel cell having:
3 (i) a membrane electrode assembly and an anode current collector
4 and a cathode current collector;
5 (ii) a mechanical coupling assembly including a first mechanical
6 coupling component disposed thereon, and a corresponding
7 second mechanical coupling component disposed at another
8 location, which second mechanical coupling component
9 corresponds with a first component of an adjacent cell to fasten
10 the fuel cell to an adjacent fuel cell; and
11 (iii) an electrical connection between each of said plurality of fuel
12 cells, to form a modular fuel cell array.

1 7. The modular direct oxidation fuel cell array as defined in claim 6 further
2 comprising
3 said first mechanical coupling component being a contoured flange
4 portion extending from one edge of said fuel cell, and said second
5 mechanical coupling component being a corresponding contoured recess
6 disposed at an opposite edge such that the flange portion on a fuel cell is
7 compressed into said recess of an adjacent fuel cell to mechanically
8 couple adjacent fuel cells together.

1 8. The modular direct oxidation fuel cell array as defined in claim 7 wherein said
2 contoured flange has a smooth, curvilinear shape, and said recess has a
3 corresponding smooth, curvilinear shape.

- 1 9. The modular direct oxidation fuel cell array as defined in claim 6 wherein said
2 mechanical coupling assembly comprises an internal spring clip.
- 1 10. The modular direct oxidation fuel cell array as defined in claim 6 wherein said
2 mechanical coupling assembly comprises an external spring clip.
- 1 11. The modular direct oxidation fuel cell array as defined in claim 6 wherein said
2 mechanical coupling assembly includes a plastic bead welded onto one aspect of
3 the fuel cell to connect it to an adjacent fuel cell.
- 1 12. A modular direct oxidation fuel cell array, comprising:
2 (A) a plurality of individual direct oxidation fuel cells, each fuel cell
3 having:
4 (i) a membrane electrode assembly and an anode current
5 collector and a cathode current collector;
6 (ii) a locking mechanism located on each fuel cell to secure
7 that fuel cell to an adjacent fuel cell;
8 (iii) an electrical connection for making electrical contact
9 between each of said plurality of fuel cells;
10 (B) a carrier component onto which each fuel cell of said plurality of fuel
11 cells is secured, forming a modular fuel cell array.
- 1 13. The modular direct oxidation fuel cell array as defined in claim 12 wherein said
2 carrier component is substantially comprised of at least one of a rigid plate, or
3 of a substantially pliable material.
- 1 14. The modular direct oxidation fuel cell array as defined in claim 12 wherein said
2 carrier component is contoured to a desired shape which shape includes a non-
3 planar and/or curvilinear shape.

1 15. The modular direct oxidation fuel cell array as defined in claim 12 wherein said
2 individual fuel cells further include tabs that are received within corresponding slot on
3 said carrier component.

1 16. The modular direct oxidation fuel cell array as defined in claim 12 wherein said
2 electrical connections between individual fuel cells are made within said carrier
3 component.

1 17. The modular direct oxidation fuel cell array as defined in claim 12 wherein said
2 carrier component includes a circuit board.

1 18. A method of manufacturing a modular direct oxidation fuel cell array, including
2 the steps of:

3 manufacturing a plurality of individual fuel cells;
4 connecting said fuel cells together electrically from the cathode of one
5 cell to the anode of an adjacent cell; and
6 mechanically securing the fuel cells together to form a fuel cell array.

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1 19. A direct oxidation fuel cell for use in a modular fuel cell array, comprising:

2 (A) a membrane electrode assembly and an anode current
3 collector and a cathode current collector;

4 (B) at least one locking mechanism located on the fuel cell to
5 secure that fuel cell to an adjacent fuel cell; and

6 (C) at least one electrical connection element for making
7 electrical contact with an adjacent fuel cell.

1 20. The direct oxidation fuel cell for use in a modular fuel cell array, as defined in
2 claim 19 wherein said fuel cell is an edge cell that includes a locking component, and
3 an electrical connection element for connection to an adjacent fuel cell, but does not
4 have a locking component or an electrical connection element on a side which
5 represents one end of the fuel cell array.

1 21. A connection assembly for use with a modular fuel cell array, comprising:
2 an electrical connection assembly having a first element disposed on a first fuel
3 cell, and an second element disposed on an adjacent fuel cell to electrically couple said
4 fuel cells together.

1 22. The connection assembly as defined in claim 21 further comprising:
2 a mechanical connection assembly having a first element disposed on a first fuel
3 cell, and an second element disposed on an adjacent fuel cell to mechanically couple
4 said fuel cells together.